Economics Department

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Are intergovernmental transfers in Russia equalizing?

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Abstract

Rapid decentralization since 1992 has left Russia's 88 regions with substantial control over their own revenues as well as significant expenditure responsibility, particularly in the social sphere. These regions are highly diverse in climate, in natural resources and in economic development, making some much better equipped than others to adjust to market conditions. The combination of diversity and decentralization makes a strong and effective system of intergovernmental transfers essential if regions hardest hit by transition are to continue to provide adequate standards of key social goods.

In this paper I examine the transfer system that has developed in Russia since 1992. I ask how far transfers have been directed to regions most in need of them, and how effective they have been in offsetting disparities in pre-transfer revenues. The main results are that the direction of transfers has been essentially equalizing over the period, but that transfers have been too small in size and too thinly spread to have made a substantial impact.

* I am grateful to John Micklewright for comments. All remaining errors are mine.

I. Introduction

The transition from command economy to the market has entailed the rapid decentralization of fiscal decision-making in countries across Central and Eastern Europe, as central governments try to lighten their own fiscal burden while simultaneously responding to the demands of economic efficiency and local autonomy. The Russian Federation has been no exception. Since 1992, its 88 regions (oblasts) have been responsible for a growing proportion of budgetary expenditure.[1] At the same time, the system of revenue allocation has been overhauled, giving the oblast real control for the first time over revenue collected locally. By 1994 almost half of all budgetary expenditure in Russia was spent at the oblast level or below, in comparison to about 40% of total expenditure in the USA spent at state level in the early 1980s. Decentralization of funding of the social sphere has been even greater: about 90% of health care expenditure and 80% of education expenditure is now a sub-national responsibility.

In all transition countries the decentralization process has raised a series of issues, but Russia's size and diversity make it somewhat unique. Geographically the largest country in the world, it contains some of the world's most valuable resources: 20% of the world's oil, 15% of its coal and 25% of its diamonds come from Russian soil, as well a wealth of other minerals and precious metals; much of this wealth is concentrated in a handful of regions in Siberia and the Far East. At the same time, large areas of the country are made uninhabitable or close to uninhabitable by climate and terrain, while a long history of uneven industrial development, concentrated in the European regions and the Urals, has added an extra element to the natural pattern of diversity. These factors combined create a heritage which has left oblasts facing transition with very different economic endowments. Naturally, some of them have been able to benefit more than others from market reforms such as the liberalization of prices and the lifting of barriers to trade.

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[1]The Russian Federation as it stood at the break-up of the Soviet Union in 1991 was composed in theory of 89 economic units, but in practice Chechenya has never been a participating member. Neighbouring Ingushetia is also excluded from the analysis below due to a lack of data. Of the remaining 87 units, only 49 officially have the Russian title 'oblast' (there are also 19 republics, 11 autonomous oblasts, 2 metropolitan cities and 6 krai), but I follow convention in using the term generically. The 11 autonomous oblasts are actually sub-units within larger oblasts; data for these are only sometimes available separately.

Fiscal decentralization in a context of such inherent regional differences demands a powerful system of intergovernmental transfers if disparities in economic strength are not simply to feed through into disparities in social income, with obvious implications for the provision of vital social goods such as health and education. Overlooked in the initial restructuring of the fiscal system, in practice such transfers have taken place in Russia since 1992. Originally allocated according to non-transparent criteria in closed-door negotiations, since 1994 their allocation has been determined by a formula mechanism.

It is not immediately clear however that either negotiations or formula have resulted in the targeting of transfers to the regions most in need of them. A number of recent studies have pointed to a series of problems. (See Bahl et al. (1993), Le Houerou (1994), Wallich (1994), Kirkow (1996) and in the Russian literature Boiko and Lavrov (1995), Lavrov (1995) and Ptitsin (1996).) They have highlighted in particular the degree to which some transfers continued to be allocated behind closed doors even after 1994, the inappropriate criteria chosen for the formula, and the fact that a number of (wealthier) regions have been allowed to negotiate their own more favourable terms with the centre with obvious implications for would-be recipient regions. Some have pointed to the high numbers of regions receiving formula-based transfers as an indicator of an inadequate degree of targeting in the system (Lavrov (1995b)), while others have claimed that particular groups do well more because of political status than economic need. Solnick (1995), for instance, is among several who claim that regions with republic status do better than others.[2]

However, very few studies have examined in detail the characteristics of the regions which do receive funds and attempted to quantify how far transfer receipts can indeed be explained by factors other than regional needs. Using data for 1992, Treisman (1995) discovers political muscle to have been important in allocation and regional needs not, while McAuley (1996) finds a significant role for needs variables in the 1995 data. This apparent change in allocation over time is interesting but the two studies use different methodology and the results cannot be compared. No study appears to have looked at the pattern of distribution in more than one year.

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[2]The fact that a number of regions pressed for republic status between 1993 and 1995 suggests that this perception has been widely shared.

Thus while the current provisions for transfer allocation are generally perceived to be unfair, the debate is not explicit about the degree to which they are unfair, which regions are suffering, and in particular about whether recent developments have improved the allocation or rather made it worse. In this paper I try to address these issues. I ask how far intergovernmental transfers since 1992 have gone to those oblasts that need them, and how far, in contrast, their allocation can be explained by alternative factors such as regional influence and negotiating power. I concentrate on one category of transfer, those intended to be equalizing, ignoring for the present other grants made with alternative goals in mind. Where relevant, I include in this category variation in the share of VAT retained in the region, as this was used in some years as an equalizing tool. I look at each year between 1993 and 1995 separately to allow for a possible change in the pattern of distribution over the period; and in particular in 1994 after the introduction of the formula-based allocation system.

The paper follows the following outline. I begin with a brief overview of the theory behind intergovernmental transfers, outlining their purpose and ideal design. I go on to describe the Russian fiscal system as it has developed since 1992, and especially -- with the theoretical ideal in mind -- the existing mechanisms for intergovernmental transfers. I then present some graphical analysis of own-revenues and transfers to give a preliminary overview of how far the latter have helped to even out disparities in the former. This raises a series of questions for which multivariate analysis is required. In Section 5 I set up two hypotheses to be tested, describe the econometric framework and introduce the explanatory variables used. Finally I present and discuss the results.

2. Intergovernmental transfers in principle: purpose and design

Transfers of revenue from one level of government to another serve a series of purposes in states with even a small degree of regional autonomy (see e.g. Oates (1972), Chapter 3). First, they are used by central governments as a way of encouraging regional expenditure on particular goods, either because they have positive externalities for other regions (e.g. health care, education), or because they are seen by the centre as merit goods (again education is a good example).

Second, they are used to iron out imbalances of two types in the fiscal system. The first type has been referred to as 'fiscal gap' or 'vertical imbalance': a mismatch between the expenditure and revenue responsibilities allocated to each level of government in aggregate. If regional governments are responsible for 40% of expenditure but only gather 30% of revenue on the taxes allocated to them, transfers from central to regional level will be in order. Vertical imbalance may occur as a result of deliberate policy because central government is seen as most efficient at tax-raising even if local government is best placed to make or implement decisions, or it may occur because of lack of foresight in the design of the fiscal system.

The second type of imbalance is sometimes called 'horizontal imbalance', or more frequently, 'horizontal inequity' (Buchanan (1950)). Where revenues raised per capita vary across regions an individual living in a poorer region will have to pay a higher proportion of income for the same level of service as an identical individual earning exactly the same in a richer region. This contradicts what has been described as 'perhaps the most widely accepted principle of equity in taxation': that 'people in equal positions should be treated equally' (Musgrave (1959), p.160). Transfers of revenues across regions are needed to iron this inequality out. Where regional income disparities are large, the implications of the inequity become more serious: not only will poorer regions have to tax individuals more heavily, they may find themselves unable to provide public services to an adequate level on the strength of their own tax base.

It is this last category of transfers that I am concerned with here, those intended to equalize revenues horizontally across regions. How should such transfers be designed? While grants intended to encourage expenditure on particular goods clearly need to be ear-marked for those goods, the literature suggests that grants intended to iron out fiscal

imbalance of either type (vertical or horizontal) should be unconditional and lump-sum so as not to compromise local autonomy (Oates, op.cit.).[3] However, while unconditional grants to cover general 'fiscal gap' would probably be identical (per capita) to all regions, equalizing grants clearly need to be targeted to those regions most in need.

Regional 'need' in this context has two main components: poor fiscal capacity and high pressure on regional services, where the latter itself comprises two key elements -- size of demand and the unit cost of provision. The challenge in designing a system of equalizing transfers is to account for each of these factors where it is beyond the control of the authorities but not otherwise. Thus regions with low revenue resulting from a small revenue base are needy while those with low revenue resulting from weak tax effort are not. Similarly, regions which face high unit costs due to scattered populations or high transport costs are needy while those spending inefficiently, or choosing to provide a higher standard of service than is seen as adequate, are not.

Every country with any degree of local fiscal autonomy has faced the problem of how to ensure that equalizing intergovernmental grants really go to those regions most in need. The simplest approach has been to avoid the problem of distinguishing factors under authority control from those beyond their control by giving the authority the benefit of the doubt. Thus in India, for example, the approach has essentially been a 'gap-filling' one: with some modifications, actual revenues and actual expenditures are taken as the measures of fiscal capacity and expenditure need; transfers are designed to make up part or all of the difference (see Rao and Sen (1995), especially p.22). Elsewhere, as in Denmark, highly complex formulae have been developed which attempt to include all the main factors affecting needs directly -- numbers of children of different ages, numbers of elderly, kilometres of road (Lotz (1981)). It should be noted however that to an extent all transfer mechanisms are still developing, as is evidenced by the OECD Workshop in 1981 on 'Measuring Local Government Expenditure Needs', which aimed to 'stimulate research and development work on the subject ... (and thereby to) improve the resource allocation process' (OECD (1981), p.6). The best design of a system of intergovernmental transfers remains an ongoing issue even in countries with well established federal structures.

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[3]This is true unless of course equity is sought not in a general package of public goods but only in certain specific ones, in which case conditional grants could be more effective. (Hofman and Wang (1993), p.27).

3. Intergovernmental transfers in the Russian fiscal system

3.1 The need for transfers

In Russia the question of intergovernmental transfers is a new one, as in the Soviet era both expenditure and funding decisions were highly centralized. Although in principle many responsibilities were delegated to lower levels of government, including almost all health care and all pre-university education, in practice the degree of autonomy was limited. Minimum levels of service provision and maximum levels of expenditure were enforced from above, with the budget of each government level supervised by the next level up and any surpluses automatically extracted at the end of each fiscal year. While this deprived local authorities of any real control, it did ensure that any disparities in oblast expenditure were the result of central decision-making, not of regional economic inequality.

Since 1992, oblast responsibilities have become much more substantive, while the relative size of the oblasts' burden has increased considerably. More expenditure responsibilities have been delegated to the local level from the centre (income maintenance programmes and some capital expenditure), while many responsibilities previously handled by local enterprises (kindergartens and polyclinics) have been divested to local authorities. Table 1 gives an indication of the extent to which the role of the oblast increased between 1992 and 1994.

Table 1: Sub-national level budgetary expenditure as a percentage of total budgetary expenditure in the category

	1992	1994
Total Expenditures	36	49
National Economy	47	71
Social Expenditures	62	81
Education	66	80
Health	89	88
Social Protection	25	66
Culture	49	64

Source: Ministry of Finance data. 'National Economy' includes capital investment, subsidies to industry and housing subsidies. All figures are exclusive of 'extra-budgetary' expenditure, meaning that the Social Protection category does not include pensions, maternity benefit, health insurance or unemployment benefit and insurance. All of these are paid from centralized extra-budgetary funds financed from payroll taxes.

As a point of comparison, 37% of total expenditure in the USA in 1982 came from state level or below, roughly equivalent to the situation in Russia in 1992 (Glendening and Mann Reeves (1984), p.228). By 1994 however almost half of all Russian budgetary expenditure was the

responsibility of the oblast or sub-oblast level. The oblast role is particularly important where social expenditures are concerned: over 80% of social expenditure now comes from sub-national government.

What really increased oblast autonomy however was the passage of the Law on the Basic Principles of Taxation in January 1992, which gave oblasts real control for the first time over the resources allocated to them. The revenues from each tax was to be assigned to a particular level of government. Revenues from Personal Income Tax (PIT), Corporate Income Tax (CIT) and 21 additional minor taxes were assigned to the oblast while Value Added Tax (VAT), all taxes on foreign trade and international transactions and all energy excise duties were to go the centre. Once allocated, these revenues were to remain the property of the relevant government level. Budget surpluses would no longer be appropriated by higher level authorities.

Naturally, the reverse side of this was that budget deficits would no longer be automatically covered, and this highlights the major flaw in the system as initially designed. Oblasts were faced with growing expenditure responsibilities on the one hand and real control over the funds raised through assigned taxes on the other, but the decentralization of expenditure responsibilities was carried out quite separately from the design of the revenue-assignment system, and there was no reason to expect one to cover the other -- either at the aggregate level (to ensure vertical balance) or at the level of the individual region (to ensure horizontal equity). The problem of vertical imbalance was exacerbated by the fact that all tax rates continued to be set at the centre, preventing oblasts from adjusting tax rates and bands to suit their own requirements. This ensured that individuals faced identical tax rates regardless of where they lived, but they would face widely differing qualities of service: wealthier regions would automatically retain more revenue per capita than poorer regions. In 1993, for instance, the top 10 regions raised on average nine times as much per capita as the bottom 10.

3.2 The design of the transfer mechanism

Although no initial provision was made to deal with either of these problems, in practice mechanisms were developed to address both. To deal with vertical imbalance, adjustments were made to the original tax share rates, most notably with respect to VAT. In the original system, all revenues raised from VAT should have been transferred to the federal

government; in practice this never happened and VAT revenues have been partially retained by the region since 1992. For the last three quarters of 1992 the region's share was fixed for all regions at 20%, in 1993 retention rates were negotiated individually with each region, and in 1994 a uniform rate was fixed at 25%. In practice however even these rates were not adhered to: retention rates have varied across regions in all periods. The motivation for this could have been to address both vertical and horizontal imbalance simultaneously, or alternatively it could simply have been the result of preferential treatment enjoyed by politically important or powerful regions. I return to this below.

A second measure which has arguably been used as a means of addressing vertical imbalance is the making of transfers under the umbrella heading of 'mutual settlements'. In principle these represent the net balance of a range of intergovernmental transactions and could flow either way (to or from the centre); in practice every region has always been a net recipient. The settlements cover expenses which are federal responsibilities but given to regions to carry out, and also compensation for central decisions which lead either to a loss in income on the part of regional budgets (due to changes in tax rates) or to growth in regional expenditures (due for example to a rise in the minimum pension or the minimum wage) (Bogacheva (1995), p.37). As such their role does seem to be to counter vertical imbalance, although it is not clear how effective they are: their lack of transparency and the fact that have no foundation in budgetary law has left them open to charges of arbitrariness and subjectivity (see e.g. Lavrov (1995), p.31).

My concern here however is with the mechanisms introduced to deal with questions of horizontal imbalance, or interregional inequality. Despite the fact that no provision was made for them in the original budget laws, subventions, or transfers intended to support oblasts too weak to finance their expenditure responsibilities, have in practice been made in Russia since 1992. Until 1994, their distribution was determined in closed door negotiations, and there was no obvious logic to the process. In 1994 however an attempt was made to rationalize their allocation and make it transparent, with the establishment of the Federal Fund for Financial Support (FFFS). The Fund, which was initially assigned 22% of all VAT revenues, is allocated to regions needing 'some support' and regions needing 'considerable support' on a formula basis. Regions which had

below average per capita revenues in a base year (initially 1993) are classified as in need of 'some support'; those that would have had difficulty in meeting their expenditure requirements even after the first round of subventions are classified as in need of 'considerable support'. The amount allocated to each region in the first category depends on the degree to which they fall below the average per capita revenue level, but is also positively related to average per capita expenditures in the wider area in which the region is located.[4] The amount allocated to regions qualifying in the second category is simply a function of the size of their budget deficit (again in the base year), i.e. the degree to which their expenditures would have exceeded their revenues without this second round of transfers. The formula remained unchanged in 1995, although the Fund was increased to 27% of VAT revenues. The formula is laid out in full in Appendix 1.

How does this system square with the demands of theory? As noted in Section 2, an equalizing transfer system needs to take account of two factors: the revenue-raising capability of the system, and the demand on the region's services, where this covers both the size of the relevant population affected and the cost of providing these services where this is beyond the authorities' control.

As the proxy for revenue-raising capability the Russian formula takes the actual sum of revenues raised per capita in a base year (1993). The obvious problem with this is that it favours regions which have low revenues because they are less rigorous about tax collection, or because they channel money into 'extra-budgetary funds' (EBFs); funds set up for specific purposes and not included in the budget.[5] The distinction between revenues raised and revenue-raising capacity is likely to be important; however, where economic strengths differ significantly across regions, it is

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[4]The 88 oblasts are grouped into 11 'economic areas': North, North-West, Central, Volgo-Vyatskiy, Black Earth, Volga, North Caucasus, Urals, Western Siberia, Eastern Siberia and the Far East. The classification is essentially descriptive and has little operational significance.

[5]There are four main federal EBFs which are funded through a compulsory payroll tax (the Pension Fund, the Employment Fund, the Medical Insurance Fund and the Social Insurance Fund), but I refer here to the smaller EBFs set up at oblast level. These are typically funded through 'voluntary contributions', but it is not implausible that local authorities and local enterprises might reach some agreement on contributions.The number of oblast level EBFs have multiplied since 1992, but their importance is hard to estimate precisely as data on them is not generally available.

plausible that per capita revenues raised would serve as a rough proxy for the latter.

Potentially more problematic is the use of actual expenditures in the base year to proxy both aspects of pressure on regional budgets -- size of demand and cost of service provision. The advantage of this approach is clear: it is simple and transparent, avoiding the complications of a formula based on a long series of indicators representing pressure on public services and cost of provision. It is particularly useful in a country where provision costs vary enormously across regions due to transportation costs, climate and compensating wage differentials for workers in less inhabitable parts of the country.[6] But the problems are equally obvious: it rewards cost inefficiency in expenditure, and it preserves the status quo, allowing regions with high expenditure levels to continue spending high, while penalizing regions with low expenditure levels in the base year, even where this has been due to financial constraint. In the first round of the formula allocation some attempt is made to control for these effects: grants to regions qualifying as in need of 'some support' are weighted not by own expenditure levels but by the average in the surrounding area. But this in itself has been criticized on the grounds that economic areas are far from homogenous with respect to the important variables, cost in particular (Lavrov (1995), p.32). In any case, it is the region's own per capita expenditures that are the relevant factor in the second round.

The essential question here is whether past levels of expenditure really reflect cost and demand differentials for service provision, or alternatively relative privilege. In the first case use of actual expenditure as a proxy for expenditure needs is justified; in the second case the formula appears to bias allocation towards relatively well-off oblasts. If this were so it could be argued that the choice of this proxy was itself influenced by more powerful regional authorities eager to protect their own position. This forms part of the question I hope to get to the bottom of below.

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[6]The coefficient of variation for the price of a basket of staples in December 1994 was about 0.3, compared with a similar coefficient of 0.07 for another large federation, Canada, in 1991 (De Masi and Koen (1995)). This is in part the result of transportation and delivery costs; variation in costs of provision of public services ought to be yet higher, due to compensating wage differentials and heating bills.

3.3 The transfer mechanism in practice

Up to this point I have been concerned with the transfer system as it was designed. Several additional issues arise when we turn to look at how it has worked in practice. First, it seems that some two thirds of the FFFS in 1994 (and about one fourth in 1995) was allocated indirectly through additional variation in the VAT retention share. It will be recalled that the oblast's share of VAT receipts was theoretically fixed at a uniform rate of 25% in 1994 but that in practice the proportion retained varied widely. This appears to have been the result of oblast bargaining to retain an additional share of VAT to cover part or all of their allocated share of the Fund, rather than sending the VAT to the centre and then waiting for transfers to be made in return.[7] As the Fund's resources came from VAT revenues, there was a certain logic to this process. Certainly regions which succeeded in following it benefited: in a context of high inflation any time lost waiting for non-indexed sums is expensive. Transfers are in principle made quarterly, but in addition there are often delays.[8] Quarterly inflation rates have been as high as 50% over the period; a three month waiting period might thus result in a region losing one third of the real value of its allocation.

The implications of this for the analysis below are two-fold. First and obvious, variations in VAT retention rates over and above the uniform 25% need to be included as part of the region's receipt of transfers from the Fund. And second, given that a region may benefit substantially from retaining extra VAT rather than waiting for transfers, we might want to ask which were the regions which managed to do this. It seems plausible that the successful regions would have been those able to pull the most weight, but an alternative (if unlikely) hypothesis would be that VAT retentions were used to give immediate assistance to oblasts really in need. A further question is whether the formula was really fully adhered to in practice, whether through direct transfers or VAT retentions. There is some evidence that in fact actual shares varied from the shares dictated by the formula (see Lavrov (1994)) but the formula is so designed that it is close to impossible to work out exactly what each region should have received

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[7]That this is the explanation of much of the variation in VAT retentions and of the fact that direct transfers from the FFFS total far below 22% of VAT revenue is suggested by the data, and is supported by analysis in Lavrov (1995).

[8]Ptitsin (1996), Minister of Finance for the Sakha Republic, claims two to three month lags are standard.

(see Appendix 1). For the purposes of this paper I stick to analysis of transfers actually received, whether or not these were fully provided for in the formula.

A second issue is that some regions have simply refused to follow the rules as laid down and have imposed their own unilaterally determined tax retention rates. Four regions in particular withheld all or almost all their revenues from the centre in both 1993 and 1994 -- Karelia, Tatarstan, Bashkortostan and Sakha (Yakutia); Sakha continued to hold onto 100% of taxes raised through 1995. Clearly in a data set on transfers and VAT retentions these regions will show up as what they are -- extreme beneficiaries, with VAT retentions of close to 100%. Thus if we control for the special status accorded them they need not bias the analysis below.

More problematic are the numerous regions (19 in total) which followed the example of the above four in withholding revenues in 1993, but whose demands were met less favourably by the centre. While the four regions listed had special regimes legitimized in bilateral agreements by the end of the year, all others faced 'strongly worded threats of sanctions' which had led them to comply in full by the end of the year (Birkenes (1997), p.2/3). The problem is that taxes should in principle be transferred quarterly, so by holding out until the end of the year regions in fact made a substantial gain, given the high rate of inflation and the fact that back payments were not indexed. Naturally however this gain does not show up in annual budget figures: these regions appear to have transferred roughly the same share of profit and income taxes as all other regions. Unfortunately in the absence of quarterly retention data there is not much that can be done about this problem and I am forced to ignore the probable benefits enjoyed by these recalcitrant regions.

A final point worthy of note is the large sum received annually by Moscow. In 1993 in particular Moscow received a 'subvention' from the federal government roughly the same size as all direct grants made from the FFFS; in later years the amount was much smaller with respect to other transfers but still substantial. These subventions are made under a special article of the budget law which provides for additional support to Moscow to cover expenses arising from its role as capital. I exclude these transfers from the analysis below on the grounds that we know (up to a certain point) why Moscow receives these funds, and although there is no

transparency to how much it receives, the process is presumably somewhat unique, not to be confused with the process determining other transfers.

To summarize this section, there are two key reasons to expect that allocation of 'equalizing' transfers may not have been ideal even after the introduction of the formula mechanism. First, the terms of the formula show a 'gap-filling' approach in which actual revenues represent revenue raising potential and actual expenditures expenditure needs: these may or may not be reliable proxies. Second, transfers appear to have been partly distributed through variations in the VAT retention rate, which may have been to the benefit of regions able to exercise influence over the centre. I now turn to look at the allocation of these transfers in practice. In the next section I present an overview of the data, before going on in Section 5 to outline the hypotheses I wish to test and to introduce the analytical framework.

4. A preliminary look at the data

Turning to look at the actual allocation of transfers there are two immediate questions. First, how large are transfers as a share of total oblast revenues? Second, do they appear to have been equalizing? The proportion of oblast revenues comprised of all types of intergovernmental transfer taken together has varied considerably since 1992, rising steadily to reach almost 24% of oblast revenues by 1994, and then dropping by almost half between 1994 and 1995. The 1994 level is roughly equivalent to the share of federal grants in state and local government expenditure in the US in 1980 (Rich (1989), p.193), but the 1995 level is low by most international standards. The OECD average for intergovernmental grants as a share of consolidated budget expenditure is about 14% (Le Houerou (1994), p.15); the 1995 level for Russia corresponds to just 6-7% of the Russian consolidated budget.

Furthermore, transfers from 'equalization funds' are themselves only a proportion of the total sum of transfers made, as illustrated in Table 2, which gives the trend in the size of different types of transfers over time. The table demands some explanation. 'Subvention' was the term given to transfers apparently used for equalization in 1992 and 1993; they disappeared with the introduction of the FFFS. 'Subventions to Moscow' mean the special provision made for Moscow as capital. 'Extra VAT retentions' are counted as any VAT retained over and above 30%; the official retention rate was 25% but I choose a higher cut-off point to

prevent regions moving from the category of 'transfer receiving' to the category of 'non-transfer receiving' simply as a result of calculating differences. As noted, there is evidence that extra VAT retentions were used as a means of distributing equalization transfers after 1994; I include them as 'equalizing' for 1993 as well for comparison purposes and also because it is plausible that their function would not have changed from one year to the next.

As Table 2 illustrates, transfers from 'equalization funds' were dwarfed in 1993 and 1994 by transfers made as 'mutual settlements'. By 1994 equalizing transfers formed only one third of total transfers made.

The picture given for 1995 however is more promising, despite the fall in the share of total transfers in oblast revenues. With the expansion of the size of the FFFS in 1995 equalization funds grew substantially, while mutual settlements shrunk, perhaps reflecting a clearer distribution of responsibilities between government levels as the fiscal system settles down. By 1995 equalization transfers formed three quarters of total transfers made. Concentrating on the distribution of equalizing transfers at the expense of mutual settlements, as is done in this paper, might seem odd in the 1992-94 context. But the fact that this type of transfer appears to be growing in importance, while mutual settlements may have been simply an adjustment mechanism, justifies the decision. Even if they are still relatively small, if equalizing transfers are going to the regions most in need then the system is moving in the right direction.

Table 2. Intergovernmental transfers as a percentage of total oblast revenues 1992-95

	1992	1993	1994	1995
Total Federal Transfers	11.9	19.8	23.4	12.4
'Equalization funds'	5.4	8.3	8.0	9.2
incl. Subventions	5.4	2.7		
Subventions to Moscow		1.0	2.3	0.8
Transfers from FFFS			2.0	6.1
Extra VAT retentions		4.5	3.7	2.3
'Mutual settlements'	5.9	11.4	14.8	2.9
Other(subsidies,short-term loans)	0.7	0.3	0.6	0.4

Sources: Ministry of Finance data, author's calculations. 1992 and 1993 data (with the exception of VAT retention data) are published in World Bank (1995). 'Extra VAT retentions' are calculated as any VAT retained by the oblast above 30% of VAT collected there.

But what can we say about the distribution of these transfers? To give a preliminary picture, Figures 1 to 3 (reproduced at the back) show Lorenz curves for own revenue retentions and concentration curves for additional VAT retentions and direct transfers. This is a one-sided way of approaching the question: as already highlighted there are many other components of regional need than revenues. However, the figures are still an illustrative way of showing distribution of funds with respect to one key variable.[9]

The figures are drawn for the distribution of total population, where each individual is treated as a 'recipient' of the average per capita revenue or transfer level in the region in which they live. All individuals from the same region will hence be identical and rank next to each other, while the proportion of x-axis space representing each region will depend on the region's population size. The distribution of own revenues per capita prior to any transfers is represented as a classic Lorenz curve: the x-axis shows the cumulative proportion of the population ranked from poorest to richest in terms of the per capita revenue level in their oblast, and the y-axis the cumulative proportion of total oblast revenues received by the corresponding proportion of people. If all oblasts had the same per capita revenue the Lorenz curve for revenues would run along the 45° line; in reality a Lorenz curve will always drop below this line.

The concentration curves are then drawn with population again ranked along the x-axis in terms of their region's per capita revenue but with the y-axis representing the proportion of total transfers (or additional VAT retentions) received by the corresponding proportion of people. Thus if transfers were equalizing we would expect the concentration curves to rise above the 45° line: the poorest 10% of the population ranked by oblast per capita revenue should receive more than 10% of transfers.

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[9]The charts are given with revenues and transfers deflated to Moscow 1991 prices using a regional Consumer Price Index weighted by the price of a basket of 19 food products in December 1991 (see Annex 2 for details). All monetary figures used from here on are deflated in the same way. The idea is that, as price levels and inflation rates vary substantially across the Russian Federation an analysis of any monetary indicator considered in nominal terms could be quite misleading. The indices used are not ideal for deflating budgetary data -- for example, they fail to take account of compensating wage differentials -- but they are the only ones available and ought to make the figures substantially more comparable.

The figures reveal several interesting patterns. First, in each year the curve representing direct transfer receipts rises clearly above the 45° line, showing a definite equalizing impact with respect to revenue receipts. In 1993 for example, the 'poorest' 50% of the population lived in regions which controlled between them less than 30% of total revenues, but which received 80% of all direct transfers made. However, no trend towards greater equalization in direct transfer receipts is displayed over the period: the curves for direct transfers in 1994 and 1995 (after the introduction of the formula) are in fact closer to the 45° line than in 1993.

Second, the distribution of transfers through the additional VAT share mechanism appears in all years to have been substantially less equalizing than the distribution of direct transfers. This is particularly true in 1993, when the curve for additional VAT retentions not only falls well below the 45° line but below the Lorenz curve for revenue receipts: additional VAT retentions were still more unevenly distributed than initial own-revenue retentions. In 1994 and 1995 however, the pattern of allocation of additional VAT is much more similar to that of direct transfers. The result is that when both types of transfer are combined, the overall impact (shown in each graph by an unbroken line) is noticeably more equalizing in 1994 and 1995 than in 1993. In 1993 the bottom 50% of the distribution received between them about half of the total sum of transfers; by 1995 their share had increased to almost 70%.

If additional VAT retentions are treated as a regular part of the transfer process (and simply a means of distributing part of the allocation determined through the formula system) then it would appear that the introduction of the FFFS and the formula in 1994 did improve the allocation. At the same time, the difference in the distributions of the two forms of transfer suggest that regions are still able to use their influence, if not to affect the total nominal amount received, then to affect the time at which it is received. In a high inflation environment this in turn means affecting the real sum. The evidence given by the figures is that the regions benefiting from receipt in the form of VAT retention are not the regions most in need.

It needs to be noted however that the difference in the two patterns represents to some degree at least the impact of the handful of regions following their own individual fiscal rules. Sakha (Yakutia), Tatarstan and

Bashkortostan all show up on the charts as steep slopes in the richest fifth of the VAT retention curve. Each of these regions effectively refused to participate in the system and negotiated their own arrangements with the federal government; as a result in 1993 they submitted no VAT to the centre. This appears to be what is driving the sharp degree of inequality observed in the distribution of VAT retentions in Figure 1: these three regions together, representing some 6% of the population, between them retain close to 40% of all VAT retentions. By 1994 Tatarstan and Bashkortostan had both begun to hand over some of the revenue, retaining only 70% in total in 1994 and 60% in 1995. Only Sakha continued to retain all VAT through 1995. This probably explains the change in the shape of the VAT retention curves over the period. It could also be the explanation of why regions which receive transfers as VAT retentions and not through the centre appear to those less in need.

To try to answer these questions and test the patterns revealed here in a wider context I now move onto multivariate analysis. This will allow me to control for the influence of the 'special case' regions, and to introduce both a wider range of variables to represent regional need and some proxies for regional power. Below I define my hypotheses, discuss the econometric framework chosen for each and introduce the possibilities for explanatory variables. In Section 6 I present and discuss the results.

5. Hypotheses, econometric framework and explanatory variables

5.1 Hypotheses

The primary aim of the multivariate analysis is to isolate the characteristics of the regions that received 'equalizing transfers' in 1993, 1994 and 1995. In a successful equalizing system, recipient regions should be characterized by a variety of 'need' indicators, representing both weak fiscal capacity and strong pressure on services. In contrast, in a corrupt system, or in one in which theoretically equalizing transfers are in practice used to alternative ends, recipients would be characterized by a series of quite different indicators, representing their political influence, their ability to negotiate or the potential threat they pose to the centre. The multivariate analysis aims to test the importance of one set of variables against the other.

This is a general framework which has been used in a series of studies of the allocation of transfers in other large federations. (See for example Holcombe and Zardkoohi (1982), Grossman (1994) and Peterson (1995) on the distribution of federal grants in the USA, and Bungey et al. (1991) on Australia.) The hypothesis that needs are the main determinants of transfers, referred to as the 'efficiency/equity/ideology' hypothesis, or 'functional theory' (since transfers fulfill their equalizing function), is tested against that of the 'public choice' hypothesis or 'legislative theory' (grants will be awarded according to the private agendas of legislators).

In the Russian case, where post-1994 allocation is governed by a simple formula mechanism, the room for public choice type explanations would appear to be limited. The formula does seem to be open to small measures of interpretation (see Appendix 1),[10] while the design of the formula itself may have been subject to influence: the choice of actual past expenditure as the proxy for expenditure needs clearly benefits certain regions more than others. However, short-term political factors will certainly have less capacity than before to influence outcomes. At the same time the replacement of a system of ad hoc bargaining with a formula mechanism ought in principle to have improved the direction of transfers to regions in need, as the preliminary analysis in Section 4 suggested that it did. I therefore formulate my main hypothesis as follows:

H1 Despite the doubts surrounding the design of the 1994 formula mechanism, its introduction led to an improvement in the allocation of equalization funds: transfers were higher after its introduction to regions with low fiscal capacity and high needs; and lower to regions with political influence or power.

This means comparing the parameters of three equations:

1. $TRANS_{i93} = \beta_1 N_{i93} + \gamma_1 P_{i93} + \varepsilon_{i1}$

2. $TRANS_{i94} = \beta_2 N_{i94} + \gamma_2 P_{i94} + \varepsilon_{i2}$

and 3. $TRANS_{i95} = \beta_3 N_{i95} + \gamma_3 P_{i95} + \varepsilon_{i3}$

[10]In the Australian case most grants are also formula-allocated, but in some cases the formulae are complicated enough to allow some subjective interpretation, allowing political factors a foothold (Bungey et al. (1991)). In the Russian case the degree of 'interpretation' possible will be limited, revolving around the way of adjusting past expenditure needs to current conditions.

where $TRANS_{it}$ is the level of 'equalizing' transfers per capita made to oblast i in year t (directly or via extra VAT retentions), **N** is a vector of needs indicators, **P** a vector of 'power' indicators and the βs and γs corresponding vectors of coefficients. H1 is effectively the hypothesis that the βs will be larger and more significant in Equations 2 and 3 than in Equation 1, while the opposite will be true of the γs.

Given that (at least in 1994 and 1995) the variation in VAT retentions was apparently used as a means of distributing legitimate transfers from the FFFS, in all years I treat transfers as equivalent whether they came directly from the Fund or whether they were given as VAT retentions. In other words, in addressing Hypothesis 1 I take as my dependent variable $TRANS_{it}$, the sum of both these types of transfer. In practice however, as discussed in Section 3.3, there is an important difference between the two. For all those regions which received transfers of some sort I therefore go on to ask the same question with respect to the proportion received as VAT transfer: was it regions in need that benefited, or regions with power? I thus formulate a second hypothesis:

H2 Oblast authorities continued to use their influence to affect the proportion of their allocation received in the form of VAT retention.

This involves examining the parameters of Equations 4-6:

$$4. \quad VATPER_{i93} = \gamma_4 \mathbf{P}_{i93} + \varepsilon_{i4}$$

$$5. \quad VATPER_{i94} = \gamma_5 \mathbf{P}_{i94} + \varepsilon_{i5}$$

$$6. \quad VATPER_{i94} = \gamma_6 \mathbf{P}_{i94} + \varepsilon_{i6}$$

where $VATPER_{it}$ is the proportion of total transfers that oblast i receives in the form of additional VAT retentions in year t, and the γs the same vectors of power variables used in Equations 1-3. H2 is the hypothesis that the γs will be positive and significant in all three equations. In practice I also include a selection of the N variables used in Equations 1-3 as control variables.

5.2 Econometric framework

a) Hypothesis 1: Tobit

Given the fact that not all oblasts received subventions at all in any of the three years 1993-95, I choose to use a Tobit framework to address Hypothesis 1. The dependent variables in Equations 1-3 each have a concentration of values at zero and then a continuous distribution of values above zero (about one third of the observations are zeroes in 1993, falling to 10% by 1995). Ordinary Least Squares estimation, which assumes all values to be part of a continuous distribution and ignores the qualitative difference between zeroes and non-zeroes, will therefore be an inappropriate estimation technique.

The Tobit itself imposes the assumption that a single underlying model determines both whether or not an oblast receives transfers and how much it receives (see for example Greene (1993), Chapter 22). This is perhaps unrealistic given that (post 1994 at least) we know the two processes to have been formally different. However, given that the purpose of the regressions is to identify and compare the characteristics of oblasts receiving transfers in different years, not to model the determination process itself, it is plausible that a Tobit would be sufficient. Furthermore, using a more general model, such as that developed by Cragg (1971), which allows the two decisions to be modeled separately by combining a univariate probit model with a truncated regression model, would be costly: it would effectively double the number of parameters to be estimated. Given the small sample size I decided to stick with the Tobit.[11]

For the Tobit model we define a new underlying variable y*, which is a linear function of the set of needs and power variables with which we hope to describe transfers, but each y_i^* is only observed if is greater than zero. That is:

$$7. \qquad y_i^* = \beta \mathbf{N}_i + \gamma \mathbf{P}_i + \varepsilon_i \qquad \varepsilon_i \sim N(0, \sigma_i^2)$$

where **N** and **P** are vectors of needs and power indicators respectively.

[11]In fact I did also estimate a Cragg model and established that for 1994 and 1995 there was some evidence that the parameters defining those oblasts which received subventions differed from those defining how much was received. However, the differences were small and concerned only the size of the effect and not the significance or sign of the variables. They did not seem to warrant abandoning the benefits of the Tobit model.

But for each observation y_i we observe:

$$y_i = y_i^* \qquad \text{if } y_i^* > 0$$

$$y_i = 0 \qquad \text{otherwise}$$

Intuitively, y* stands for the level of transfer that would be received if a negative transfer (or taxation) process operated according to the same mechanism as the actual transfer process. If we could observe y*, we would observe negative values for richer oblasts (if the mechanism was equalizing). In practice, as there is no negative transfer process, we observe $y_i = 0$ wherever y_i^* would be negative: y_i is essentially censored at zero. β and γ are estimated by maximum likelihood.

b) Hypothesis 2: Two Limit Tobit

In testing Hypothesis 2 I automatically exclude for each year the observations which received no transfers at all. However, the censoring problem remains: as the dependent variable is measured as a percentage it is naturally bounded both from below at zero and from above at 100. In practice in 1993 and 1994 there were no zero observations but a substantial proportion of 100s (20% in 1993 and 13% in 1994). In 1995 only 5% of observations received all transfers in the form of VAT retention but 17% received none.

Again therefore an OLS framework would not appear to be appropriate. This time the choice of a Tobit as the alternative is more clear-cut, as censoring is not imposed by the operation of a separate mechanism but results simply from measurement of the dependent variable in percentage terms. Thus we define a new underlying variable z*, a linear function of the set of needs and power variables, but this time each z_i^* is only observed if is greater than zero or less than 100. That is:

$$8. \qquad z_i^* = \beta \mathbf{N}_i + \gamma \mathbf{P}_i + \varepsilon_i \qquad \varepsilon_i \sim N(0, \sigma_i^2)$$

where **N** and **P** are vectors of needs and power indicators respectively. But now for each observation z_i we observe:

$$z_i = z_i^* \qquad \text{if } 100 > z_i^* > 0$$

$$z_i = 100 \qquad \text{if } z_i^* > 100$$

$$z_i = 0 \qquad \text{if } z_i^* < 0$$

The idea here is simply that no region can retain more than 100% or less than none of its transfers as VAT, no matter how high or low its recorded level of the explanatory variables. If the percentage of transfers an oblast receives in the form of VAT is determined by the oblast's power, we can see z_i^* as an underlying unobserved variable representing this power: we observe only z_i, a percentage bounded from above and below.

5.3 Dependent variables

As discussed, the dependent variable in Hypothesis 1 is the sum of direct transfers received by the oblast as equalization funds, and the amount received as additional VAT retentions over and above 30%. Descriptive statistics are presented in Table 3. Figures are in per capita terms and in Moscow 1991 prices, as deflated by the price index detailed in Appendix 2. 76 oblasts are included: that is, all oblasts except Ingushetia and the 11 autonomous oblasts, for which not all data is available. (These 11 represent between them only about 3% of the total population.)

There are three interesting elements in Table 3. First, the mean level of transfers (excluding zeroes) fell by about one-third between 1993 and 1994, and in 1995 at 204 roubles per capita it was still lower than it had been before the introduction of the formula system. Second, the number of regions receiving transfers increased dramatically: in 1993 21 regions out of 76 received nothing; by 1995 the figure was only 7 regions, less than 10%. That a greater number of regions are receiving transfers, and that they are receiving less each on average, does not suggest that there has been an improvement in targeting. The 1995 allocation would make sense only if there were 7 extremely wealthy regions able to support 69 oblasts in need, and this seems unlikely. The allocation could however still represent an improvement on the past if the oblasts 'targeted' in 1993 were not those most in need.

The third point worth noting is that the mean as measured over all 76 oblasts also fell substantially (some 30%) between 1993 and 1994, recovering almost but not entirely by 1995. Thus although the sum allocated to the FFFS increased between 1994 and 1995, this was still not enough to match the amount spent on transfers and extra VAT retentions in 1993.

Table 3: Descriptive statistics for dependent variables in H1: Transfers plus additional VAT retentions over 30%, roubles per capita (76 observations, constant Moscow 1991 prices)

	Mean (non-zeroes)	Mean (all obs)	Minimum (non-zeroes)	Maximum	Standard deviation	Zeroes (no.)
1993	269	195	44	749	168	21
1994	173	139	1	645	131	15
1995	204	185	5	909	165	7

The dependent variable in Hypothesis 2 is the percentage of total transfers which is received in the form of VAT retentions. Only regions which received some form of transfer are included as observations for each year. Furthermore, the four regions which received transfers simply because they did not participate in the system (and so received additional VAT by default) were also dropped, as the reason they received all transfers in the form of VAT retention is clear. Descriptive statistics are presented in Table 4. I present statistics for all observations only.

It is worth drawing attention in Table 4 to the large number of regions which benefited to some degree from additional VAT retentions. This was by no means a practice confined to the recalcitrant regions referred to in Section 3.3. In fact in 1993 and 1994 every single oblast to receive transfers received them at least in part in the form of additional VAT share. By 1995 however VAT retention appears to have become far less important in the transfer process: one sixth received no extra VAT, only one received all transfers as VAT, and the mean share of VAT in total transfers had fallen to 20%.

Table 4: Descriptive statistics for dependent variables in H2: Percentage of total transfers received in form of VAT retentions

	No. of obs.	Mean (all obs)	Standard deviation	Zeroes (no.)	Hundreds (no.)
1993	51	52	32	0	8
1994	57	60	25	0	4
1995	65	21	20	11	1

5.4 Explanatory variables

The explanatory variables used to test H1 fall into two broad categories -- those representing regional need and those intended to proxy regional power and influence in Moscow. Within the needs group two separate effects need to be covered, fiscal capacity and pressure on local services. The latter is itself the result of two separate factors, the size of demand and the unit cost of provision. The challenge is to include each of these factors but only insofar as they are beyond local authority control.

Needs variables

1. FISCAL CAPACITY

The easy route in measuring fiscal capacity is to give local authorities the benefit of the doubt over tax collection and treat actual revenues collected per capita as a rough measure of revenue raising potential. This is essentially what the FFFS formula chooses to do, and there are fairly strong arguments for doing it here too. In a context in which direct measures of economic strength such as income levels, unemployment and oblast production levels all carry substantial measurement problems, actual revenues may be as accurate as any alternative, while their use makes the analysis decidedly more straightforward. I therefore follow the approach of the FFFS on this count, including as the first explanatory variable in each equation per capita oblast revenues prior to any transfers (lagged, i.e., for the year prior to that in which the transfers were made):

- Own revenues per capita in the year prior to transfers (measured in 1991 prices).

2. PRESSURE ON SERVICES

The FFFS formula uses a combination of past levels of expenditures in the region in question and average past expenditures in the surrounding area as a proxy for both elements of expenditure needs, demand for local services and unit cost of provision. Here I try to model the factors influencing expenditure needs directly.

a) Demand for local services

I initially tried including the following two variables as indicators of pressure on local education services on the one hand and on local health services on the other:

- Percentage of the population under 16;
- Percentage of the population over working age.

In practice however these two variables are quite strongly negatively correlated: regions with a high proportion of young people (often those in the North and Far East) tend to have fewer pensioners. Combining the two into a single variable (the proportion of the population not of working age) loses the effect of either, so I replace PENSION with an alternative measure of demand on health care services:

- The infant mortality rate.

This variable ought also to reflect both weak inherited infrastructure in the health care sector and generally poor local conditions: infant mortality in developing countries tends to be highly correlated with poverty, and may therefore be a good proxy for poverty here. (Poverty headcount data is available by oblast for 1994 but there are question marks about its reliability, particularly as a comparative measure.). Life expectancy at birth was also tried as an alternative but infant mortality proved to be more effective.

b) Cost of unit provision

Four variables were initially included to represent different costs of service provision facing regions:

- Dummy for Northern status: a dummy for regions partially located north of 67 degrees latitude, intended to pick up increased costs of transport and heating;
- Wage in the education sector: the average regional monthly wage in the education sector, deflated to Moscow 1991 prices. The point here is that, aside from nominal differences in wages resulting from price variation, 'compensating wage differentials' have traditionally been paid to workers to encourage them to live in harsh parts of the country. These differentials represent an additional cost of employing each worker beyond the control of the authorities. (The education wage is intended as a proxy for all public sector wages.) I include the wage for 1992, adjusted for regional inflation in later years, on the grounds that since 1992 authorities have had more control over public sector wages and differentials may not partially represent preferences;
- Oblast population. Small regions may face higher unit costs of provision as they will be unable to exploit economies of scale. I try replacing this with the log of population, as the importance of changes in size is likely to diminish as the oblast gets bigger;
- Percentage of the population urbanized. Again, economies of scale mean that the marginal cost of provision of goods and services is likely

to fall as the concentration of the population in urban areas increases. Sparsely populated rural areas may require more funding per capita to provide the same level of services as more developed areas. (As cities increase in size diseconomies of scale may set in due to the costs of congestion and the higher price of factor goods, and it is possible that expenditure needs per capita start rising again. I tried including a Moscow City/St. Petersburg dummy but it was always insignificant.)

Power variables

There are a variety of different ways in which regions might exercise influence over the centre, but these can broadly be divided into two general categories: blackmail style tactics (threats) and ingratiating tactics (having friends in the right places).

To represent the first I include five variables. The first two are intended to represent respectively the likelihood and significance of a region withdrawing cooperation from the centre (that is, the importance of appeasing the region):

- Republic status. Despite the fact that all regions are declared equal in the Constitution, the 19 republics consider themselves to be more autonomous than other types of regions (oblasts, krai) and have been considerably more outspoken in their demands on the centre. They formed the bulk of the group of regions to call for sovereignty in 1992 and 1993, and were the first to sign bilateral fiscal agreements with the centre. As a result they are widely held to have benefited from special treatment. This dummy for republican status is intended to pick up the material effects of this status. (As republics are also in principle ethnically based, it should also pick up the effect of any transfers made to ease ethnic tension.)
- The percentage of national fuel production which is produced in the region. This is intended to represent the potential danger offered if a region does choose to secede.

The second pair of variables are included to represent different types of threat to the centre: on the one hand threat of civil unrest and on the other personal threat to Yeltsin's power:

- Number of workers on strike: the number of workers per 10,000 who went on strike in the year prior to that in which transfers were made.
- Support for Yeltsin 1993: The degree of support displayed for Yeltsin in the referendum of April 1993 (the percentage of voters to respond

'yes' to the question 'Do you have confidence in the President of the Russian Federation, B.N.Yeltsin?'). The idea here is that transfers may have been used to bribe regional leaders to come out in support of Yeltsin in areas where he was most likely to lose; hence we might expect a negative correlation between the 'yes' vote and receipt of transfers. (Alternatively, of course, transfers may have been used as a reward for well-behaved regions, in which case the coefficient would display the opposite sign.) Naturally this variable is more likely to be significant for 1993 transfers than for those in later years but no similar data is available afterwards until the Presidential election of 1996. (Data for elections to the Duma are much less clear cut -- see below.)

Finally I include a dummy variable for the four regions which enjoyed special status over the period:

- Dummy for special status: a dummy included for Karelia, Tatarstan, Bashkortostan and Sakha (Yakutia).

'Threat' variables are perhaps unique to a somewhat lawless situation such as that prevailing in the former Soviet Union, and are not usually included in analyses of transfer allocation in more stable western democracies. In contrast, measures of the second type of influence, having friends in the right places, are included in these studies. The variables chosen however are generally along directly political lines, such as the proportion of regional representatives who come from the majority central party, whereas in the Russian case the party system seems too ill-defined and too new to make party affiliation a good indicator of an oblast's influence.[12] It seems more likely that past personal and political relationships will be of significance than the party a regional leader belongs to now. This is perhaps especially convincing when one considers that there is an 82% overlap between current regional elites and the old Soviet era regional nomenclature, and 75% overlap in central government and the presidential circle (Hanson (1996), p.3).

If this is right, a variable representing the degree of privilege enjoyed by the oblast in the past may be a reasonable proxy for access to the ear of central authorities today. I therefore include one variable intended to pick up this privilege:

- The percentage of urban households with a private telephone at the end of the Soviet era (1990).

[12]See Maximov (1995) on the difficulty of categorizing current parties even as far as pro- and anti-reform. The large number of independents complicates the issue further.

For the analysis of Hypothesis 2 I use this same set of power variables and also include a selection of the needs variables to control for population size, regional wealth etc.: I include revenues per capita, population size and urbanization. In all cases, variables were taken for the year prior to that in which the transfer was made, except for urbanization (1992 for all regressions) and for variables clearly constant over time. These can be seen in Table 5, where means and standard deviations are given for each explanatory variable.

Table 5: Descriptive Statistics for explanatory variables (76 observations)

	1993		1994		1995	
	Mean	SD	Mean	SD	Mean	SD
NEEDS						
Own revenues per capita (1991 roubles)	1,083	912	1,391	748	1,213	774
Population under 16 (%)	25	3.5	24	3.5	24	3.5
Infant mortality rate (deaths per 1000 live births)	17.8	3.0	19.7	3.4	18.6	2.7
Northern (dummy)	7 positive values					
Average wage in the education sector in 1992 (1991 roubles)	355	126	389	146	356	130
Population (thousands)	1,904	1,512	1,904	1,510	1,902	1,504
Population (log)	7.3	0.74	7.3	0.74	7.3	0.75
Urbanization (%)	69.2	13.0	as 1993		as 1993	
POWER						
Republic status (dummy)	19 positive values					
Percentage of national fuel production (%)	1.3	3.8	as 1993		as 1993	
Workers on strike per 10,000	36.2	72.1	2.6	12.4	9.1	26.1
Support for Yeltsin 1993 (% 'yes')	56.0	12.3	as 1993		as 1993	
'Special status' (dummy)	4 positive values					
Households with a private phone 1990 (%)	30.4	11.1	as 1993		as 1993	

Note: Figures given are those for the variable used in the regression for the year indicated.

6. Results

6.1 Hypothesis 1: the allocation of transfers

Table 6: Tobit results for per capita transfer allocations in 1993, 1994 and 1995 (76 observations per year)

Explanatory variables	1993	1994	1995	*Exp.sign of* β
NEEDS				
Own revenues per capita	**-0.11** (-2.4)	**-0.06** (-2.6)	**-0.05** (-2.0)	-
Under 16s	6.6 (0.9)	3.1 (0.6)	**10.9** (2.1)	+
Infant mortality rate	**12.2** (1.7)	**7.5** (1.8)	**11.9** (2.1)	+
Northern (dummy variable)	**-191** (-2.4)	**-88.3** (-1.8)	12.2 (0.2)	+
Education wage	**0.64** (1.8)	**0.21** (1.9)	0.15 (0.9)	+
Population (log)	**-91.4** (-3.1)	**-45.1** (-2.3)	**-79.3** (-3.4)	-
Urbanization	**-3.5** (-1.9)	**-4.5** (-3.9)	**-4.3** (-3.1)	-
POWER				
Percentage of fuel production	-7.1 (-1.0)	**-7.7** (-2.3)	-3.6 (-0.9)	+
Special status	**617** (5.8)	**316** (5.0)	**148** (2.2)	+
Phone access 1990	**3.6** (2.0)	1.3 (0.8)	1.4 (0.8)	+
Constant	474 (1.4)	**506** (2.3)	**532** (2.0)	
Standard error	139.9	89.5	105.3	
Log likelihood	-366.5	-370.3	-423.4	
Pseudo R^2	0.08	0.10	0.09	

T-statistics are given in brackets. Variables in bold were significant at the 10% level. For the needs variables, the 'expected signs of β' are those which we would expect to see if transfers were equalizing with respect to the variable in question; for the power variables, they are those we would expect if oblast threats or influence were positively affecting the level of transfers received.

Table 6 presents the results of the Tobit regressions run on transfers in each of the years 1993 to 1995. Variables not significant in any of the

three equations were dropped. The same formulation was kept for all three years to ease comparison.

Two things are immediately striking about these results. First, there is no clear evidence that a change in regime took place between 1993 and 1994. Signs and significance of coefficients show remarkable continuity over the period despite the introduction of the formula system in 1994. In fact there appears to be more difference between results for 1994 and 1995 than for those for 1993 and 1994.[13] Second, across the period needs variables appear to be both significant and indicative of an equalizing effect; 'power' variables are less significant and also more equivocal in their impact.

With the exception of the dummy variable for northern location, all needs variables which are significant display an equalizing impact across the period. Other things equal, per capita transfers were significantly higher in 1993 and 1994 to regions with lower own-revenues per capita, a higher infant mortality rate, higher public sector wages (hence higher costs of provision), and smaller and more rural populations. In 1995 public sector wages no longer had an explanatory impact, but transfers were higher to regions where a greater proportion of the population was below working age. Hence across the period transfers do seem to go to regions with lower fiscal capacity, greater demand on services, and higher unit provision costs.

The flow of transfers thus seems to have been in the right direction. But *how far* did transfers succeed in compensating for differing needs and revenue abilities? With respect to differences in revenue-raising ability, the impact of transfers appears small. Other things equal, in 1993 each per-capita rouble less raised in own-revenues was compensated by just one tenth of a rouble in additional transfers. After the introduction of the formula system in 1994, the degree of compensation halved: in 1994 and 1995 only one in twenty roubles less in own-revenues was replaced by a transfer. Thus while more transfers did go to poorer than to richer regions, their impact appears to have been negligible, post-1994 in particular. The difference between the coefficient for 1993 and those for the later two

[13]A likelihood ratio test does however allow us to reject at the 1% significance level the hypothesis that the coefficients are the same across either pair of years. The test statistic for the hypothesis that the coefficients for 1993 and 1994 were identical was 32.6; that for the same hypothesis for 1994 and 1995 was 28.7. The critical value in both cases was 24.7 at the 1% significance level.

years is in part due to a fall in the total sum made available for transfers (notably with respect to 1994), and in part to the greater numbers of regions qualifying for assistance (notably with respect to 1995, when the total sum available was similar to that in 1993, but when all but seven regions were eligible for transfers).

What of the impact on transfer receipts of variation in the cost of service provision? Here transfers appeared to respond extremely well in 1993, and again much less well after the introduction of the formula. In 1993 an extra rouble on the average cost of employing a worker in the education sector was met by a per capita increase in transfers of 0.64 roubles; in 1994 an extra rouble meant only 0.21 roubles extra per capita. However, as the total number of public sector employees ought to be substantially less than one per capita, this suggests significant *over*-compensation in 1993: high cost regions may have received far more than they needed to cover their costs, the situation in 1994 representing an improvement. The fact that the education wage is not significant at all in 1995 is mysterious.

In each year transfers were also higher to regions with smaller populations and to those with lower urbanization rates. The log of population proved to have greater explanatory power than a linear population term, implying a diminishing role for population size as population increases. A region with a log population size one standard deviation below average would have received an additional 60 or 70 roubles per capita in 1993 and 1995, and about half that in 1994 (some 20-30% of the average per capita transfer). A region with an urbanization rate one standard deviation above the average would have benefited by roughly the same amount, between 50 and 60 roubles extra per capita in each year.

The last variable included to proxy provision costs, the dummy for northern regions, is the only needs variable which clearly shows a counter-equalizing effect for transfers. In theory the dummy is intended to pick up the additional costs of heating etc. associated with service provision in the Far North; in practice, holding other factors constant, it seems that the seven regions located furthest north get substantially less in transfers than other areas. Their situation was particularly harsh in 1993, when being Northern meant 190 roubles per capita less against a mean transfer of 195 roubles per capita. In 1994 Northern regions got 90 roubles less on average against a mean of 140 roubles, so the negative impact was still substantial. As a point of comparison, in both years

Northern regions would have had to have per capita revenues two standard deviations higher than the mean to compensate for their Northern status, or an education wage two or three times higher. Given that northern regions have higher compensating wage differentials than elsewhere a relationship might seem plausible between the two variables: the northern dummy might be acting to dampen the impact of the education wage at the upper end of the scale. However, the large size of the coefficients on the northern dummy makes this unlikely. Furthermore, a non-linear term for the wage (the education wage squared) turned out not to be significant, while the result for the northern dummy proved robust to the exclusion of the education wage altogether.

Finally, turning to the variables representing demand on regional services, we find a smallish impact, despite the general equalizing direction of transfers. In all three years an additional 3 points on infant mortality (roughly the standard deviation) brings in roughly between 25 and 35 roubles more in transfers per capita. The proportion of the population below working age is significant only in 1995 when an additional 3 percentage points of children in the population (again the standard deviation) means about the same in transfers as an extra 3 points on infant mortality.

These results are summed up in Table 7, which shows how many additional roubles per capita would have been received by a hypothetical region differing from a standard region with respect to each of the given needs characteristics. The size of the variation chosen for each variable is roughly equal to the standard deviation from the mean for that variable in 1993. The average actual transfer (including zero values) is given in the bottom row for reference.

The table makes it easier to address the first part of Hypothesis 1. Were transfers higher after 1994 to regions with low fiscal capacity and high needs? The table shows that in 1993 a region which had greater needs than the average in all of the given categories would have received a total of 334 roubles per capita more than a region with average characteristics. After the introduction of the formula system, the same high-needs region would only have received an additional 197 roubles per capita in 1994 and 229 roubles in 1995. The formula mechanism, while making the system transparent and apparently less arbitrary, does not seem to have improved its practical impact for regions in need. The difference appears largely due to the diminishing responsiveness of transfers to the regional level of per

capita own-revenues and to the education wage. It should also be noted that it is not simply a result of a change in total transfers made. If we compare the extra received by the hypothetical needy region to the average overall transfer made (i.e. if we compare the bottom two rows of Table 7) we find a ratio of 1.7 in 1993, falling to 1.4 in 1994 and 1.2 in 1995.

Table 7: Benefit gained from differing from a standard region with respect to each needs variable (roubles per capita)

Variable	Difference from standard region	1993	1994	1995
Own revenues per capita	900 roubles less	99	54	45
Percentage under 16s	3 percentage points higher			33
Infant mortality rate	3 percentage points higher	37	23	36
Education wage	130 roubles higher	83	27	
Log population	750 less	69	34	59
Urbanization	13 percentage points less	46	59	56
Total extra gained by a region differing from standard on ALL above characteristics		*334*	*197*	*229*
AVERAGE PER CAPITA TRANSFER (ALL OBSERVATIONS)		*195*	*139*	*185*

The only needy regions which look to be doing better in 1995 than before are those in the north. A region with all the need characteristics given in Table 7 but located in the Far North would have received only an additional 143 roubles per capita in 1993 and 109 roubles in 1994, but 229 roubles in 1995.

What of the second part of Hypothesis 1? Transfers may not be more equalizing post 1994 than before, but the formula should at least have diminished the impact of regional power over the allocation process. That part of transfers not explained by needs factors should now be explained less well by power factors; if not more equalizing their allocation should at least be more arbitrary.

Turning back to Table 6 we find that in practice this does appear to be the case, although it is noteworthy that three of the factors included as 'power'

proxies had no impact at all. The most surprising of these is the dummy included for regions with republic status. Despite the conventional wisdom, being a republic had no effect on a region's receipts once population size and revenues had been controlled for. A fourth variable, the percentage of national fuel output produced in the region, was significant in one year only and had the opposite sign to that expected: other things equal in 1994 a greater share of fuel output was associated with lower transfer receipts, indicating that this was not used as a means of influencing central decisions.

As expected, the influence of having 'special status', that is of being one of the four regions to have special regimes legitimized with the centre, was enormous in 1993, falling over time as these regions began to comply with general rules. In 1993 being one of the Big Four brought in on average 617 additional roubles per capita. In practice, the average receipt in these four regions was 520 roubles per capita, suggesting that none of the benefit received by these regions can be explained by other variables: in fact without the impact of their special status they would have received 'negative' transfers. By 1994 however this status only brought in 316 roubles per capita (average receipt in practice -- 300 roubles), and in 1995 150 roubles.

The special status variable however is somewhat different from the other indicators of power. Of these only the extent of the phone network in 1990, theoretically representative of past favour from central authorities, is positive and significant and this only in 1993. In 1993 an extra 10% of households with access to a private telephones was associated, other things equal, with an additional 35 roubles per capita in transfers against the mean of 195 roubles, but in 1994 and 1995 it no longer had any impact. This appears to suggest that connections at the centre were useful in gaining additional funds in the ad hoc system of 1993, but not after the introduction of the formula -- which is intuitively appealing and evidence in favour of the second part of Hypothesis 1. We do need to be somewhat careful however: given the difficulty of isolating power proxies and the other factors that may influence them this is a very tentative conclusion.

6.2 Hypothesis 2: The percentage of transfers received as VAT retentions

Table 8: Tobit results for percentage of VAT retentions in transfers 1993, 1994 and 1995 (51, 57 and 65 observations respectively)

Explanatory variables	1993	1994	1995	Exp.sign of γ
CONTROL CHARACTERISTICS				
Own revenues per capita	0.01 (1.2)	**0.01** (2.0)	-0.00 (-0.3)	
Population	**0.014** (3.9)	0.004 (1.2)	0.002 (0.7)	
Urbanization	**1.2** (3.4)	0.35 (1.1)	0.01 (0.0)	
POWER VARIABLES				
Republic status	6.7 (0.7)	-2.7 (-0.3)	3.9 (0.5)	+
Fuel production	-0.64 (-0.8)	0.25 (0.1)	-1.6 (-1.2)	+
Workers on strike	**-0.08** (-1.7)	0.29 (0.1)	**0.28** (2.5)	+
Support for Yeltsin 1993	**0.59** (1.7)	-0.14 (-0.4)	-0.19 (-0.6)	+
Phone access 1990	-0.60 (-1.5)	-0.63 (-1.3)	-0.15 (-0.4)	+
Constant	**-72.7** (-2.9)	40.7 (1.5)	19.6 (1.3)	
Standard error	21.8	22.6	21.7	
Log likelihood	-199.8	-244.1	-249.8	
Pseudo R^2	0.11	0.04	0.02	

Results in bold are significant at the 10% level. Naturally only regions receiving some form of transfer were included. In addition, the four regions benefiting from special regimes (Karelia, Tatarstan, Bashkortostan and Sakha (Yakutia) were omitted as they by definition received all transfers in VAT retentions.

Table 8 gives results for Tobit regressions run on the percentage of transfers received in the form of VAT. As discussed above, there are substantial advantages to receiving transfers in this form rather than remitting the bulk of VAT collection to the centre and then waiting for transfers to arrive through the official channels. Given high inflation, non-indexed transfers and often long payment delays, the method through which transfers are received can make a significant difference to the real value of a region's allocation. In the results for Hypothesis 1 we saw that

needy regions appeared to do less well from transfers in 1995 than they had done under the closed-door system of 1993. But the proportion of these transfers made as VAT retention was much higher in 1993 (50%) than in 1995 (20%), even when the four 'special status' regions are exluded. If it is the less needy and the more powerful that are able to benefit from this means of allocation, it could be that the new system is an improvement on the old after all.

The regression results which are presented in Table 8 are however somewhat surprising. Expected to reveal a pattern of richer regions manipulating the system to their own ends, in practice they reveal no particular pattern at all. The clearest impression the results give is that, if any particular factors were important in determining which regions benefited from receipt through VAT retention, these factors were unique to a single year and did not persist over time. None of the variables included proved significant in more than one year. In 1993, larger and more urbanized regions were likely to receive more transfers as VAT retention, while there also seemed to be both a 'reward' effect for regions which supported Yeltsin in the 1993 referendum and a 'punishment' effect for regions with higher numbers of workers involved in strikes. In 1994 however the only significant characteristic of regions which did well was that they tended to be richer: each extra hundred roubles in own revenues per capita was associated with an extra percentage of transfers as VAT. But by 1995 own revenues were again no longer relevant, and the percentage of workers involved in strikes now had the opposite role to that in 1993: more strikes meant a higher share of transfers through the VAT retention mechanism.

These miscellaneous results defy generalization: no pattern emerges over time, and the lack of continuity suggests that the significance of any given variable in a particular year is purely coincidental. Naturally it is quite possible that the power variables used are simply not picking up a key instrument of regional influence, but the inability of the variables included to pick up any consistent pattern is interesting. A system which allows transfers to be allocated by two different mechanisms, where this results in unintended changes in the final sum received, can be condemned for both its injustice and its inefficiency. However, it is encouraging to note that the distinction appears to be genuinely arbitrary, rather than benefiting regions with influence at the expense of those with greatest need.

7. Conclusions

While in a country of Russia's size decentralization of the fiscal system is perhaps essential, the high degree of regional economic diversity makes a strong and effective transfer mechanism crucial if all regions are to continue to be able to provide adequate standards of public services during the transition and beyond. The Russian transfer system has developed in a fairly ad hoc fashion since 1992 and has come in for substantial criticism for insufficient targeting, for allowing wealthier regions to negotiate their own terms and for favouring politically threatening regions over those really in need. In this paper I have attempted to address and quantify these claims by isolating the characteristics of regions receiving transfers over the period 1993-1995. I aimed to establish whether these transfers are really going to regions in need of them, and if not then whether their allocation is apparently arbitrary or affected by factors of regional power and influence. At the same time, I hoped to discover whether the replacement of closed door negotiations with a formula mechanism in 1994 made a favourable difference to allocations.

The results of this paper tend to support the system's critics rather than the system itself, although some of the conclusions can be painted in a positive light. It is true for instance that the four regions which refused to play by the rules (and were tolerated in so doing) received what in practice amounted to substantial transfers when they ought not to have qualified for anything at all. But this situation has improved over time: by 1995 only one of these regions was remitting no tax receipts to the federal budget -- this could almost be seen as a victory for the federal authorities. In addition to these four, there are a number of regions which benefited in more subtle ways by exploiting a high inflation environment, either by remitting their taxes with several month delays, or by taking their transfer allocation immediately as VAT retention instead of waiting for transfers to be made through official channels. The former phenomenon was impossible to investigate in the absence of monthly budget data, but an analysis of the characteristics of regions receiving transfers as VAT showed, surprisingly, no evidence that those to benefit were richer or more powerful than other regions. The dual-channel allocation system remains inefficient and unjust, but at least it appears to have worked randomly. Another positive result is that the relative importance of VAT retention in transfer receipts is becoming less important over time, accounting for only 20% of receipts in 1995 in comparison to 50% in 1993.

Finally, across the period the distribution of transfers has been basically equalizing, with per capita transfers higher to regions with greater needs. Regions with lower per capita own revenues, higher infant mortality, more children, higher compensating wage differentials, and smaller and more urban populations all received more per capita in transfers. Only northern regions appeared to suffer, with the seven regions located furthest north receiving substantially less in transfers than other areas with similar characteristics. Even in 1993, before the introduction of the formula, transfers followed this equalizing pattern, suggesting that transfers were allocated on the basis of need even when the mechanism was non-transparent. Furthermore, though there did appear to be some indication of a link between power variables and transfers in 1993, the evidence was extremely weak. In particular, once special status and population size had been controlled for, there was no evidence that republics did better than other regions, despite widely held belief. In 1994 and 1995 none of the power variables other than that for special status had a role to play.

However, the success of the system ought not to be overplayed on the basis of these findings. It is crucial to note that, although in the right direction, transfers over the period have made little more than a dent in the pre-transfer revenue distribution. In 1994 and 1995, holding all other characteristics constant, only one in twenty roubles less in own revenues raised per capita was compensated by a transfer. What is more, in this sense the allocation was substantially worse in 1994 and 1995 than before the introduction of the formula: in 1993 one in ten roubles less in own revenues was matched by compensation. Thus not only do the transfers appear to be of little more than nominal assistance, but three years of tinkering with the system seems only to have made it worse.

There are two different reasons for the system's weak equalizing impact. The first is an inadequate level of total funds made available for transfers. The size of equalization funds hit bottom in 1994, but in 1995 was still low by international standards: the share of total transfers in consolidated budget expenditure was less than half the OECD average. The second reason is that the literature appears to be right in claiming that targeting is inadequate and transfers too widely spread, particularly since the introduction of the formula mechanism. Classifying all regions with expenditures higher than revenues as in need of support simply allows too many regions to qualify. While it may be that they *are* all in need of

support, an intergovernmental transfer system is of necessity about relative need: it is a zero sum game.

As of 1997 some changes are to have been made to the transfer system which may improve it. In particular, the fund's base is to be changed to 15% of all federal revenue in an attempt to make its revenue more stable; this ought also to lead to an increase in the fund's size. In addition the adjustment coefficients for the first round of transfers are to be changed in a way that should benefit northern regions. But the basic substance of the formula will not be affected, which means the vast majority of regions will continue to qualify as needy. This in turn makes it likely that regions which are worst off will continue to receive insubstantial assistance. Given the high degree of responsibility which regional governments now hold for financing essential public services, this is disturbing and calls for continuing close attention.

Figure 1

Concentration curves for revenue/transfer 'receipts' 1993

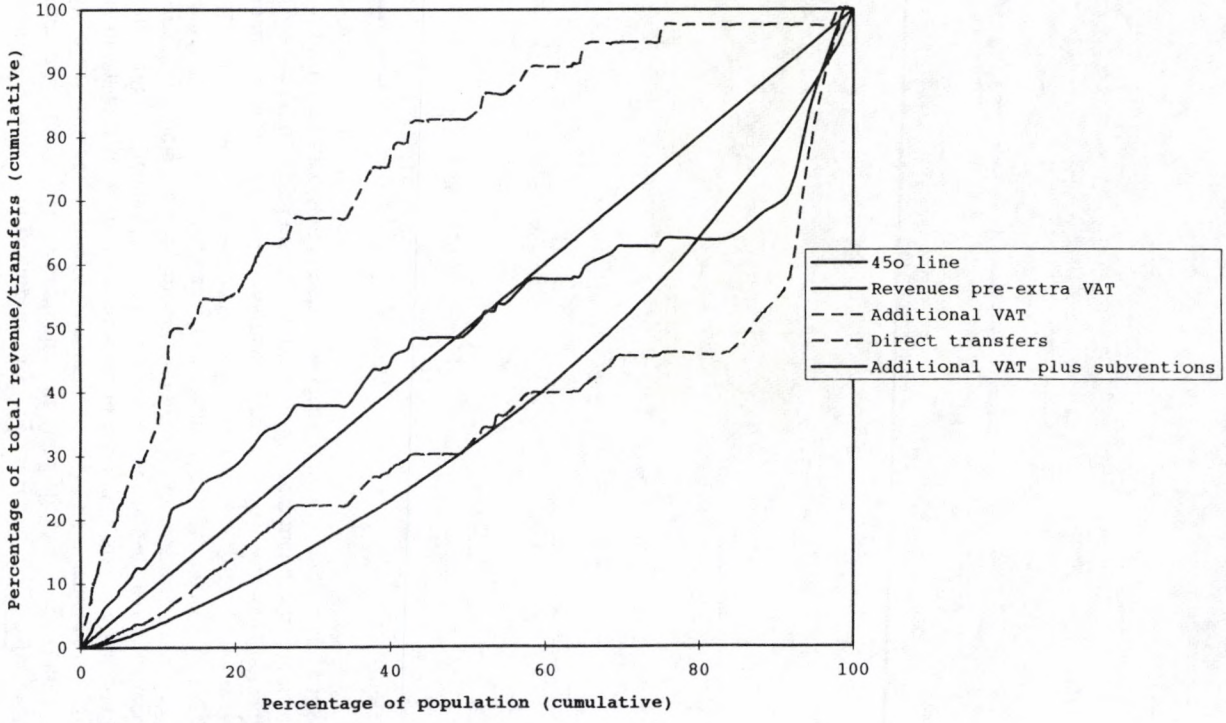


Figure 2

Concentration curves for revenue/transfer 'receipts' 1994

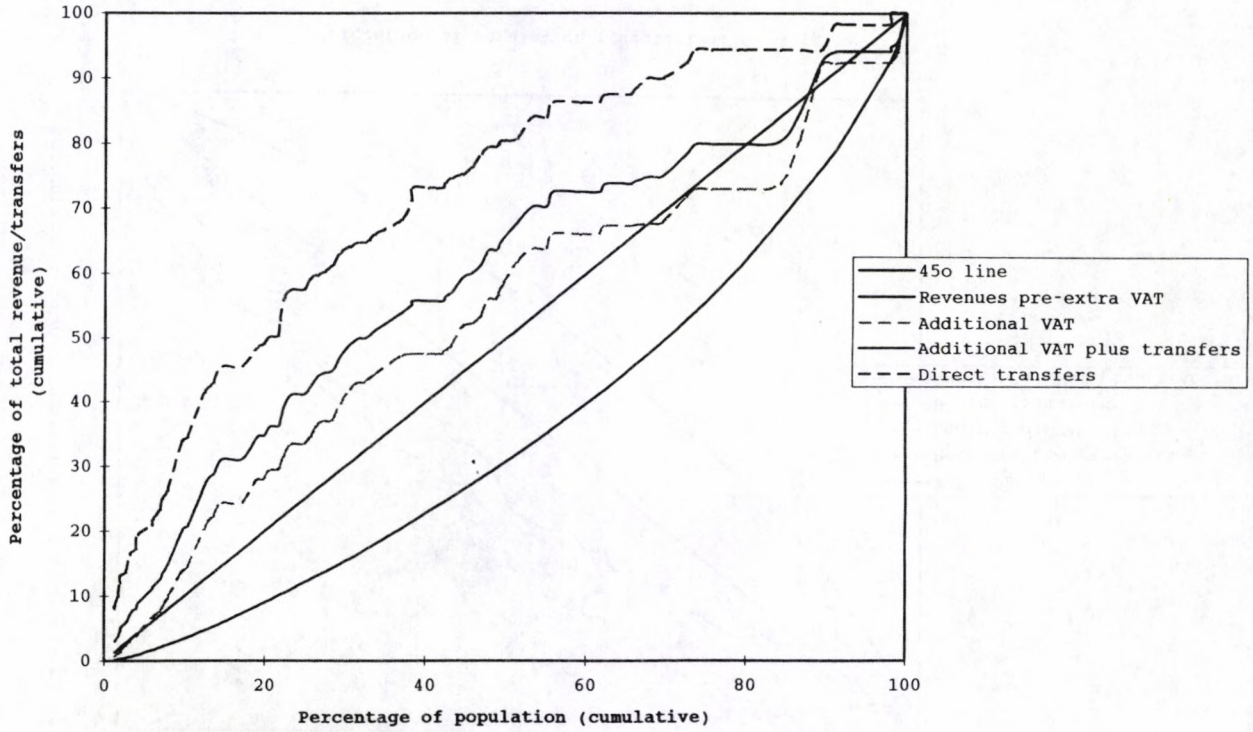
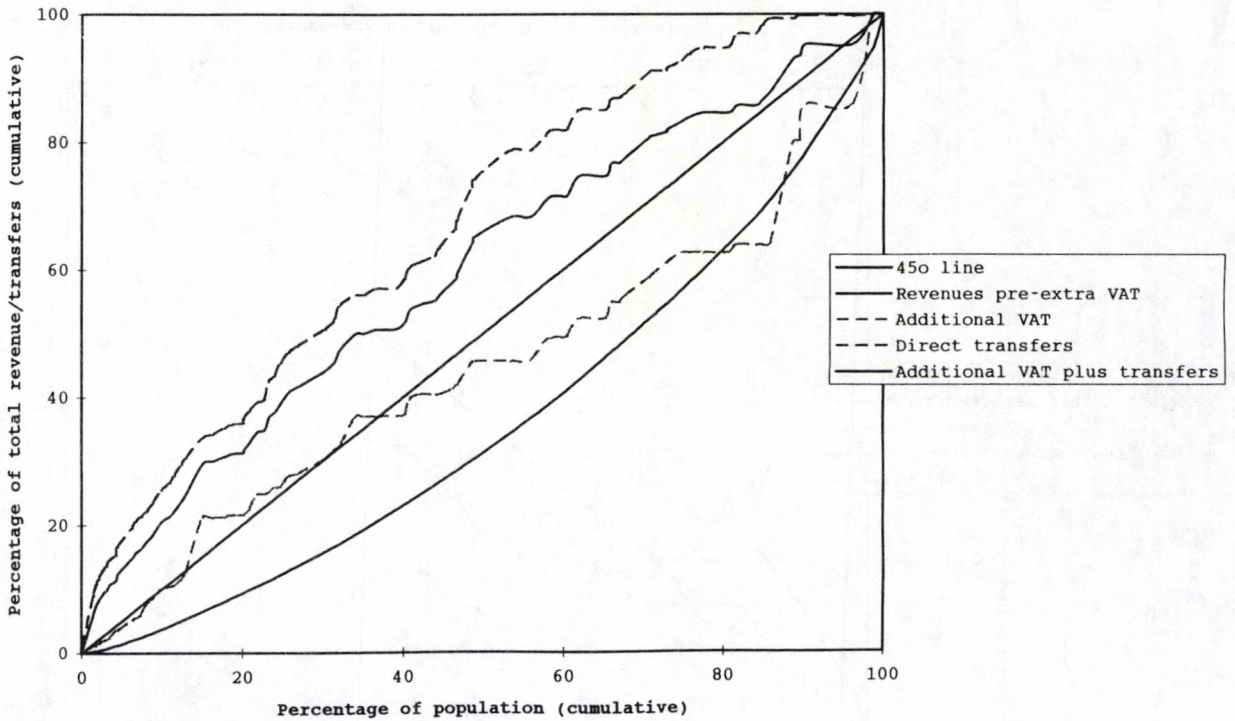


Figure 3
Concentration curves for revenue/transfer 'receipts' 1995



Appendix 1 Terms of the FFFS formula 1994 and 1995[14]

Round 1: Regions in need of support

Qualification

Using data for the base year (1993), oblasts are classified as being in need of support if:

$$1. \quad Rev_{ob} < Rev_{RF} * 0.95$$

where:

Rev_{ob} = per capita tax revenue in a given oblast, adjusted for current conditions;

Rev_{RF} = per capita tax revenue in the RF for the same period of time, adjusted for current conditions; and

0.95 is the so-called 'coefficient of incentive', used to encourage oblasts to find their own resources for expenditure financing.

The decisive factor then is simply the oblast's per capita revenues in relation to the national average. 'Adjusted for current conditions' means taking into account changes in assigned revenue sources since the base year; that is, what would have been raised in 1993 had revenue assignment been the same as in the year in question. (This adjustment is what makes it difficult for us to recalculate an oblast's entitlement precisely.)

How large is the subvention?

If an oblast qualifies as being in need of support, the size of the transfer it should receive is calculated as follows, again using data for the base year (1993):

$$2. \quad Tran_{NS} = Pop_{w/o} * (Rev_{RF} - Rev_{ob}) * (Exp_{ER} / Rev_{RF})$$

where:

$Tran_{NS}$ = total rouble amount of the transfer to the oblast in need of support (in Round 1 only);

$Pop_{w/o}$ = oblast population excluding the population of 'closed cities' (which come directly under the jurisdiction of the Ministry of Defence and the Ministry of Nuclear Energy and are financed separately);

[14]From Boiko and Lavrov (1995), Khodorovich (1995), World Bank (1995)

Exp_{ER} = average per capita regional expenditures (excluding capital investment) of all oblasts in the same 'economic region' (North, North-West, Central, Volgo-Vyatskiy, Black Earth, Volga, North Caucasus, Urals, Western Siberia, Eastern Siberia and the Far East). adjusted for current conditions.

The amount of the grant is thus determined by the difference between the oblast's per capita revenues and the national average, weighted by the ratio of expenditures in the region as a whole to average revenues in the Federation. 'Adjusted for current conditions' means taking into account changes in expenditure responsibilities since the base year; that is, what would have been spent in 1993 if expenditure responsibilities were as they are in the year in question.

Round 2: Regions in need of considerable support

Qualification
Oblasts are classified as being in need of 'considerable support' if:

$$3. \quad Tran_{NS} + (Pop_{w/o} * Rev_{ob}) < TotExp_{ob}$$

where:
$TotExp_{ob}$ = total expenditures of the oblast budget excluding capital investment, adjusted for today's conditions.

Thus to qualify oblasts simply need to have total revenues (after the first theoretical round of transfers) less than total expenditures.

How large is the subvention?
Eligible oblasts are then entitled to an additional transfer calculated as:

$$4. \quad Tran_{CS} = TotExp_{ob} - (Tran_{NS} + Pop * Rev_{ob})$$

i.e. simply the amount which will enable them to cover their expenditures. Note that oblasts do not need to qualify for the first round of transfers in order to be eligible for the second round. An oblast with very high per capita revenues but even higher current expenditures would classify as an oblast in need of 'considerable support', and qualify for a rouble sum sufficient to allow it to cover these expenditures.

Adjusting for total available funds

In a final stage, the calculated transfers are adjusted to be consistent with the total funds available in the year in question. This is done as follows:

5. $FinTran_{NS} = TotalFunds_{NS} * (Tran_{NS} / \Sigma Tran_{NS})$

6. $FinTran_{CS} = TotalFunds_{CS} * (Tran_{CS} / \Sigma Tran_{CS})$

where:
$FinTran_{NS/CS}$ = final amount of transfer made to region in need of support/considerable support;
$TotalFunds_{NS/CS}$ = the total amount available to all oblasts found in need of support/considerable support;
$Tran_{NS/CS}$ = amount of transfer to oblast in need of support/considerable support as calculated on basis of data for the base year (as above).

Appendix 2 Mechanism used for deflation of monetary terms

The deflation of oblast level monetary indicators presents difficulties as prices vary not just over time but between oblasts. While an oblast-specific Consumer Price Index does exist, it only exists as an index based on a standard of 1991=100 for each oblast; i.e., no base is available which allows for comparison across oblasts at any given point in time. Thus while we can calculate, say, a Moscow 1994 figure in Moscow 1991 prices using the oblast CPI, we cannot translate a St. Petersburg 1994 price into Moscow 1994 prices.

The one index which does provide the required cross-oblast base is the so-called '19 goods' index. This measures the cost in each oblast of a basket of nineteen foodstuffs which comprise the food component of the subsistence minimum basket, calculated by the Ministry of Labour since 1992. The cost of the basket is available for each December starting from 1992. The December cost of the 19 goods basket is clearly far from ideal as a proxy for the level of the CPI in that year, particularly given that a significant amount of price liberalization had already taken place in 1992 and that foodstuffs are likely to have been kept under administrative control longer than other goods. However, it appears to be the only way in which monetary variables can be made close to comparable across oblasts.

I adjust the oblast CPI by the 19 goods index as follows:

Let CPI_{it} be the cost of the Consumer Price basket in year t in oblast i, if the cost of the basket in 1991 in oblast *i* was 1 rouble, i.e.:

$$CPI_{it} = (\text{Cost of Consumer Price basket})_{it} / (\text{Cost of Consumer Price basket})_{i1991}$$

Then let $19g_i$ be an adjustment coefficient based on the relative cost of the 19 goods basket in each oblast in December 1992, i.e.:

$$19g_i = 19g_{iDEC92} / 19g_{bDEC92}$$

where $19g_{iDEC92}$ is the cost of the 19 goods basket in oblast *i* in December 1992 and $19g_{bDEC92}$ is the cost of the basket in a base region in December 1992 (Moscow City is used as the base region).

Then $CPI19_{it} = CPI_{it} * 19g_i$

so that $CPI19_{it}$ is an oblast specific price index with 1991 as a base, adjusted by a coefficient for December 1992 to made the index comparable across oblasts as well as over time.

I then use $CPI19_{it}$ to deflate nominal levels of transfers for each oblast *i* for each year t, to get levels of each variable in 1991 prices, adjusted by the oblast coefficient, i.e.:

$TRANS_{it} = NOMTRANS_{it} / CPI19_{it}$

where $NOMTRANS_{it}$ is the nominal level of subventions in oblast *i* in year t and $TRANS_{it}$ is the real, deflated level of subventions.

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